

AMENDMENT OF THE CLAIMS

1. (original) An oxygen doping method to a gallium nitride single crystal substrate, comprising the steps of:

preparing a non-C-plane gallium nitride single crystal seed having a surface except C-plane,

supplying the non-C-plane gallium nitride seed with material gases including a gallium material, a nitrogen material and an oxygen material without silicon,

growing a gallium nitride bulk crystal upon the non-C-plane gallium nitride seed in vapor phase,

maintaining the non-C-plane surface on the growing gallium nitride bulk crystal, and

doping the growing gallium nitride bulk crystal with oxygen via the non-C-plane surface.

2. (original) The method according to claim 1, wherein the non-C-plane surface is $\{kk-2kh\}$ planes (k, h ; integer) and the $\{kk-2kh\}$ planes are maintained during the growth as the surface of the growing gallium nitride bulk crystal for doping the crystal with oxygen via the $\{kk-2kh\}$ planes.

3. (original) The method according to claim 1, wherein the non-C-plane surface is $\{k-k0h\}$ planes (k, h ; integer) and the $\{k-k0h\}$ planes are maintained during the growth as the surface of the growing gallium nitride bulk crystal for doping the crystal with oxygen via the $\{k-k0h\}$ planes.

4. (original) The method according to claim 2, wherein the non-C-plane surface is {11-20} planes (A-planes) and the {11-20} planes are maintained during the growth as the surface of the growing gallium nitride bulk crystal for doping the crystal with oxygen via the {11-20} planes.

5. (original) The method according to claim 3, wherein the non-C-plane surface is {1-100} planes (M-planes) and the {1-100} planes are maintained during the growth as the surface of the growing gallium nitride bulk crystal for doping the crystal with oxygen via the {1-100} planes.

6. (original) An oxygen doping method to a gallium nitride single crystal substrate, comprising the steps of:

preparing a foreign material single crystal seed having three-fold rotational symmetry or a C-plane gallium nitride single crystal seed having a C-plane surface,

supplying the foreign material seed or the C-plane gallium nitride seed with material gases including a gallium material, a nitrogen material and an oxygen material without silicon,

growing a gallium nitride bulk crystal with facets having non-C-planes upon the foreign material seed or the C-plane gallium nitride seed in vapor phase,

maintaining the facets having the non-C-planes on the growing gallium nitride bulk crystal, and

doping the growing gallium nitride bulk crystal with oxygen via the non-C-planes of the facets.

7. (original) The method according to claim 6, wherein the non-C-planes of the facets are $\{kk-2kh\}$ planes (k,h ; integer) and the $\{kk-2kh\}$ planes are maintained during the growth as the facets on the growing gallium nitride bulk crystal for doping the crystal with oxygen via the $\{kk-2kh\}$ planes.

8. (original) The method according to claim 6, wherein the non-C-planes of the facets are $\{k-k0h\}$ planes (k,h ; integer) and the $\{k-k0h\}$ planes are maintained during the growth as the facets on the growing gallium nitride bulk crystal for doping the crystal with oxygen via the $\{k-k0h\}$ planes.

9. (original) The method according to claim 7, wherein the non-C-planes of the facets are $\{11-21\}$ and $\{11-22\}$ planes and the $\{11-21\}$ and $\{11-22\}$ planes are maintained during the growth as the facets on the growing gallium nitride bulk crystal for doping the crystal with oxygen via the $\{11-21\}$ and $\{11-22\}$ planes.

10. (original) The method according to claim 8, wherein the non-C-planes of the facets are $\{1-101\}$ planes and the $\{1-101\}$ planes are maintained during the growth as the facets on the growing gallium nitride bulk crystal for doping the crystal with oxygen via the $\{1-101\}$ planes.

11-20. (canceled)

21. (new) The method according to claim 7, wherein the non-C-planes of the facets are $\{11-22\}$ planes and the $\{11-22\}$ planes are maintained during the growth as the facets on

the growing gallium nitride bulk crystal for doping the crystal with oxygen via the {11-22} planes.

22. (new) The method according to claim 7, wherein the non-C-planes of the facets are {11-21} planes and the {11-21} planes are maintained during the growth as the facets on the growing gallium nitride bulk crystal for doping the crystal with oxygen via the {11-21} planes.

23. (new) The method according to claim 1, wherein the non-C-plane surface includes {1-101} planes.

24. (new) The method according to claim 1, wherein the non-C-plane surface includes {11-22} planes.